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Full Erratum for "Experimental Study of the Development of Scour and Backfilling"

Peres Akrawi Hartvig[1,2], Jess McCann Thomsen[3], Peter Frigaard[1], Thomas Lykke Andersen[1]

This erratum concerns the paper of Hartvig et al. [2010]. Through recent work with the data from the paper, two general errors have been discovered, namely:

- The scour volume has inadvertedly been over-estimated in the paper. This was because V_{pile} was inadvertedly *added* to the void volume rather than *substracted* as it should have been in the procedure described on p. 170-172. This error affects the reported values for the scour volume and scour shape factor, the fitting coefficients and some figures.
- The illustration of the scour shape factor was somewhat mistaken since it was realized that scour holes will not be *perfectly* geometrically similar during scouring since the pile dimension will remain unchanged – and therefore the hole is not scaled completely uniformly in all dimensions.

The above errors result in the following eleven corrections:

1) On p. 171-172, Tables 2-3 respectively, the existing *values* for the scour volume V and the scour shape factor ψ should be changed to:

Profile no.	V	ψ
A.01	0	-
A.02	0.0017	11
A.03	0.0013	36
A.04	0.0011	91
A.05	0.0009	162
A.06	0.0035	8
A.07	0.0058	8
A.08	0.0075	8
A.09	0.0069	11
A.10	0.0064	16
A.11	0.0053	22
A.12	0.0085	8
A.13	0.0118	7
A.14	0.013	8
A.15	0.012	9
A.16	0.011	13
A.17	0.010	16
A.18	0.019	7
A.19	0.02	8-9
A.20	0.02	7-8

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A.21	0.02	9-10
A.22	0.02	11-13
A.23	0.02	14-16
A.24	0.03	10-11

and

Profile no.	V	ψ
B.01	0	-
B.02	0.0002	48
B.03	0.0006	23
B.04	0.0010	17
B.05	0.0016	14
B.06	0.0021	12
B.07	0.0022	11
B.08	0.0022	9
B.09	0.0031	9
B.10	0.0033	8
B.11	0.0083	8
B.12	0.0074	7
B.13	0.0076	7
B.14	0.0081	7
B.15	0.0100	8
B.16	0.0099	7
B.17	0.0110	8
B.18	0.0102	7
B.19	0.0139	8

2) Figures 6, 11, 12, 13, 18, 19, 20 and 21 should be replaced with the present ones.

3) In Figs 8 and 15, the values for V should be replaced by the corresponding corrected values from the first of the above tables.

4) On p. 182, fifth line below section 6.1.1, *"… a minimum value, equal to 8-9 in the present tests …"* should be changed to *" … a minimum value, equal to 7-8 in the present tests …"*

5) On p. 182, *"Once the scour shape factor has converged, the rate of scour depth is only affected by the rate of scour volume which can be deduced from (16) and can be seen in Fig. 12."* should be changed to *"As the scour shape factor approaches the minimum limit, the rate of scour depth will be governed by the rate of scour volume which can be deduced from (16) and can be seen in Fig 12."*

6) On p. 184, Eq. (28), the values in the equation should be changed to:

$$\left.\begin{array}{l} V_{0,A.01-02}/D^3 = 0 \\ V_{0,A.05-08}/D^3 = 0.4 \\ V_{0,A.11-14}/D^3 = 5.8 \end{array}\right\} \quad V_{\infty,A}/D^3 = 13.7 \pm 0.7, \quad t_{V,A} = 9.5\text{min} \pm 1.2\text{min}, \quad t_{V,A}{}^* = 0.42 \pm 0.05, \quad n = 10$$

$$V_{0,B.01-07}/D^3 = 0, \quad V_{\infty,B.01-07}/D^3 = 2.3 \pm 0.1, \quad t_{V,B} = 8.9\text{min} \pm 0.8\text{min}, \quad t_{V,B}{}^* = 0.21 \pm 0.03, \quad n = 7$$

7) On p. 184, just below Eq. (28), *"… weaker current, but this discrepancy is within the confidence range of the parameters."* should be changed to *"… weaker current, and this trend exceeds the confidence range of* $t_V{}^*$*."*

8) On p. 189, Eq. (35), the values in the equation should be changed to:

$$\left.\begin{array}{lll} \psi_{0,A.02-05} = 11.2, & V_{0,A.02-05}/D^3 = 1.7, & w_{A.02-05} = 0.01 \\ \psi_{0,A.08-11} = 7.8, & V_{0,A.08-11}/D^3 = 7.5, & w_{A.08-11} = 1.8 \\ \psi_{0,A.14-17} = 7.9, & V_{0,A.14-17}/D^3 = 12.9, & w_{A.14-17} = 71 \end{array}\right\} \quad c_1 = 250 \pm 81, \quad c_2 = 1.9 \pm 0.1, \quad n = 12$$

9) On p. 190, Eq. (36), the values in the equation should be changed to:

$$\left.\begin{array}{l} V_{0,A.02-05}/D^3 = 1.5 \\ V_{0,A.08-11}/D^3 = 7.3 \\ V_{0,A.14-17}/D^3 = 12.9 \end{array}\right\} \quad V_{\infty}/D^3 = 0.1\ [0;1.3], \quad t_V = 113\text{min} \pm 18\text{min}, \quad t_V{}^* = 5.0 \pm 0.8, \quad n = 12$$

10) On p. 190, just below eq. (36), *"Roughly speaking, the normalized time scale is* $t_V{}^* \approx 10^{-1}$ *in the current-scoured tests and* $t_V{}^* \approx 10^0 - 10^1$ *in the wave-backfilled tests."* should be changed to *"Roughly speaking, the normalized time scale is* $t_V{}^* \approx 10^{-1}$ *in the current-scoured tests and* $t_V{}^* \approx 10^0$ *in the wave-backfilled tests."*

11) On p. 191, just below eq. (38), *"… that wave-current-backfilling in series E is about three times slower than current-scour in series A-B and about four times faster than the wave-backfilling in series A."* should be changed to *"… that wave-current-backfilling in series E is about three times slower than current-scour in series A-B and about five times faster than the wave-backfilling in series A."*

References

Hartvig, P.A., Thomsen, J.M., Frigaard, P. & Andersen, T.L., 2010. Experimental study of the development of scour & backfilling. *Coastal Eng. J.*,. pp.157-94.

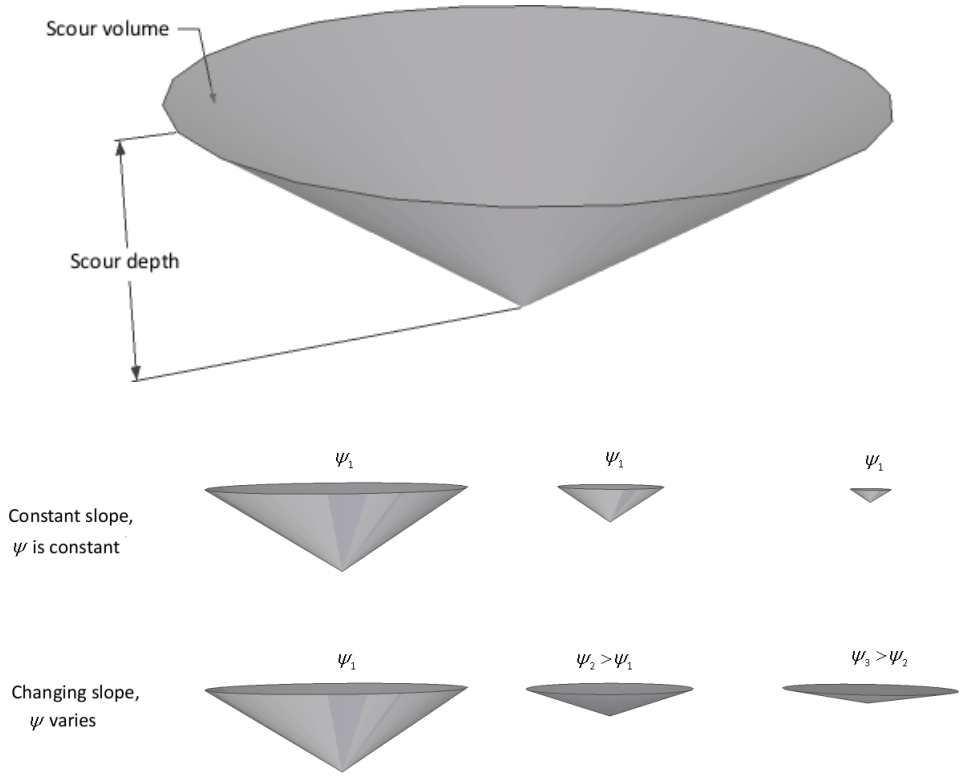
Scour volume
Scour depth
Constant slope,
ψ is constant
ψ_1
ψ_1
ψ_1
Changing slope,
ψ varies
ψ_1
$\psi_2 > \psi_1$
$\psi_3 > \psi_2$

Figure 6.

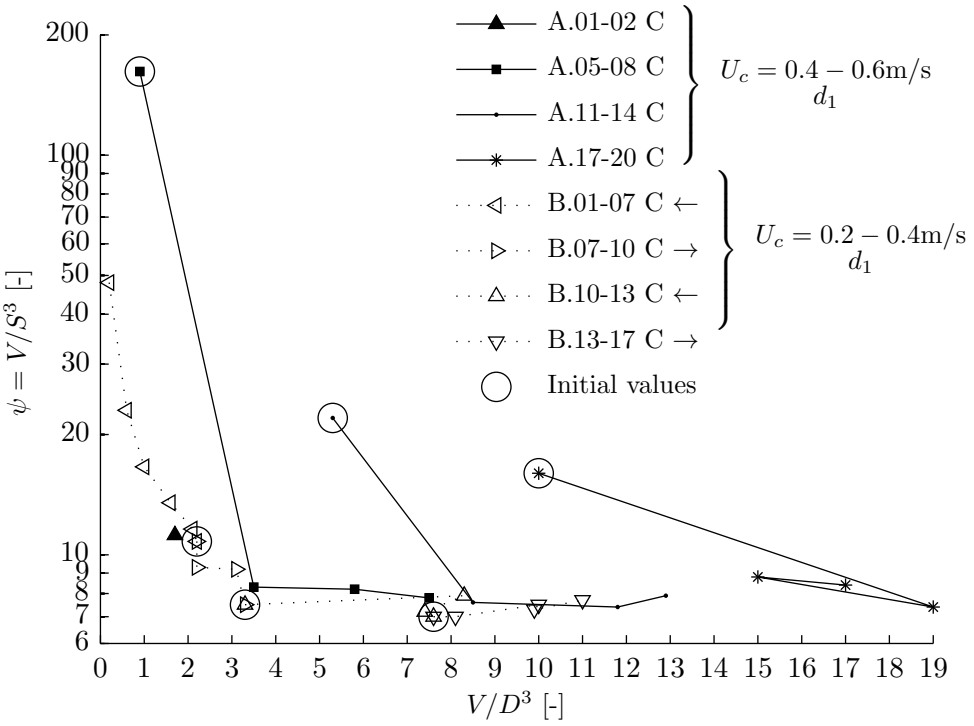
A.01-02 C
A.05-08 C
A.11-14 C
A.17-20 C
$U_c = 0.4 - 0.6$m/s
d_1
B.01-07 C ←
B.07-10 C →
B.10-13 C ←
B.13-17 C →
$U_c = 0.2 - 0.4$m/s
d_1
Initial values
$\psi = V/S^3$ [-]
V/D^3 [-]
200
100
90
80
70
60
50
40
30
20
10
9
8
7
6
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Figure 11.

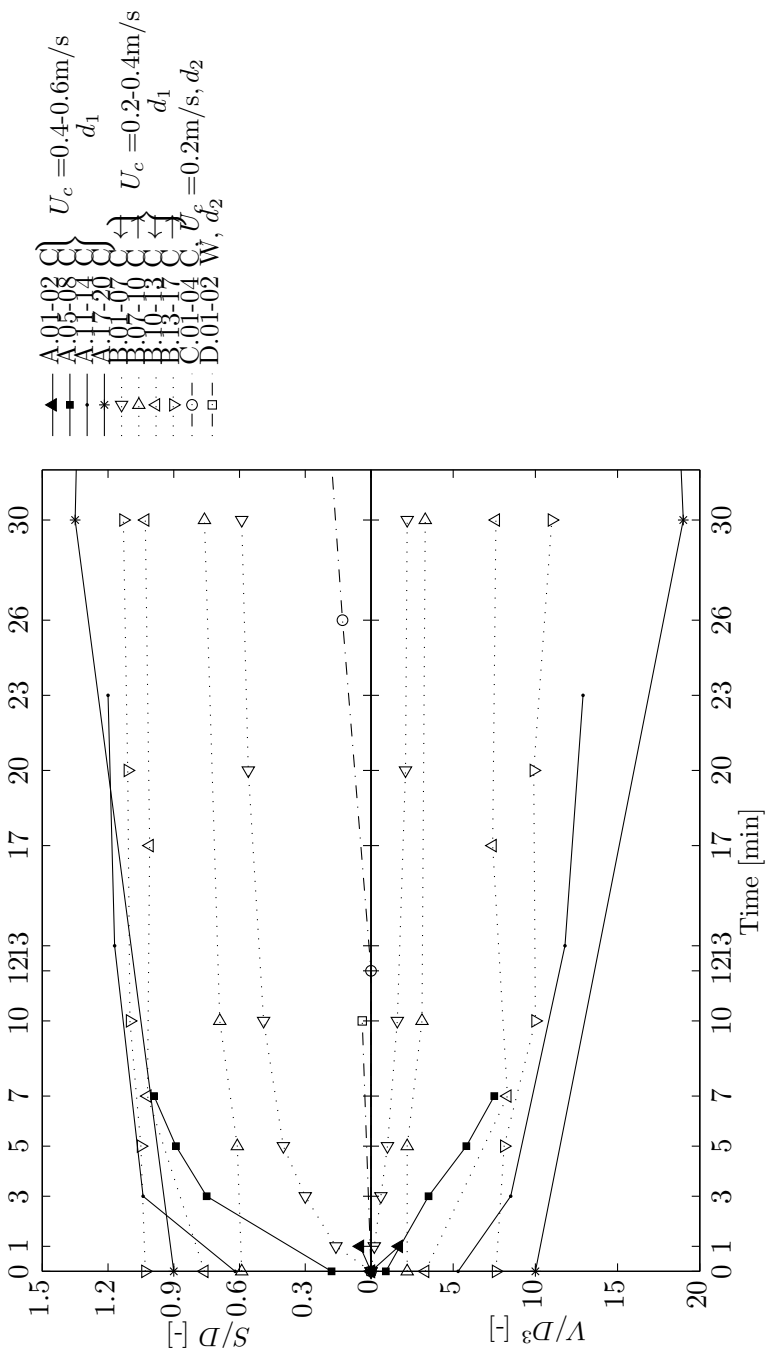
A.01-02
A.05-08
A.17-20
B.01-07
B.07-10
B.10-13
B.13-17
C.01-04
D.01-02
U_c =0.4-0.6m/s
d_1
U_c =0.2-0.4m/s
d_1
U_c =0.2m/s, d_2
W, d_2
S/D [-]
V/D^3 [-]
Time [min]

Figure 12.

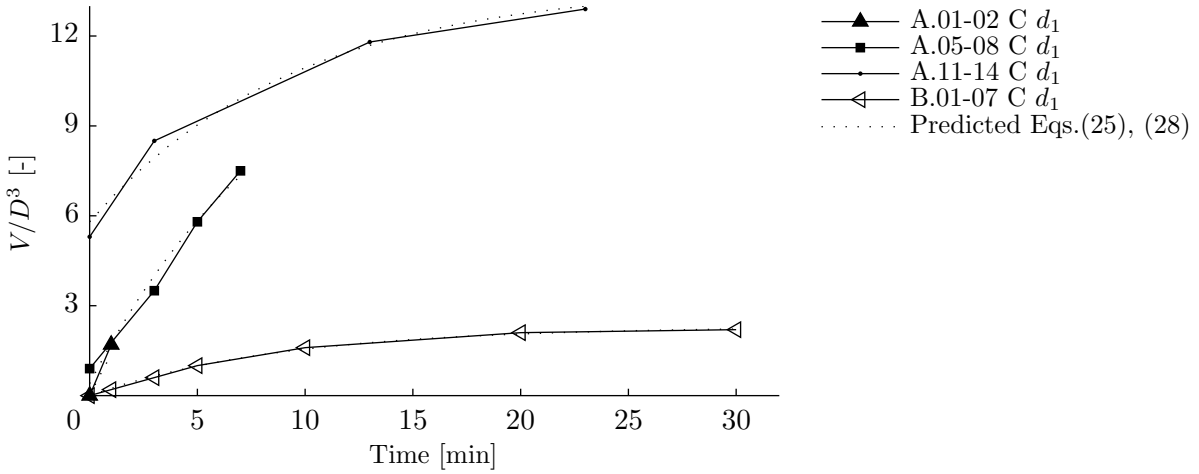

Figure 13.

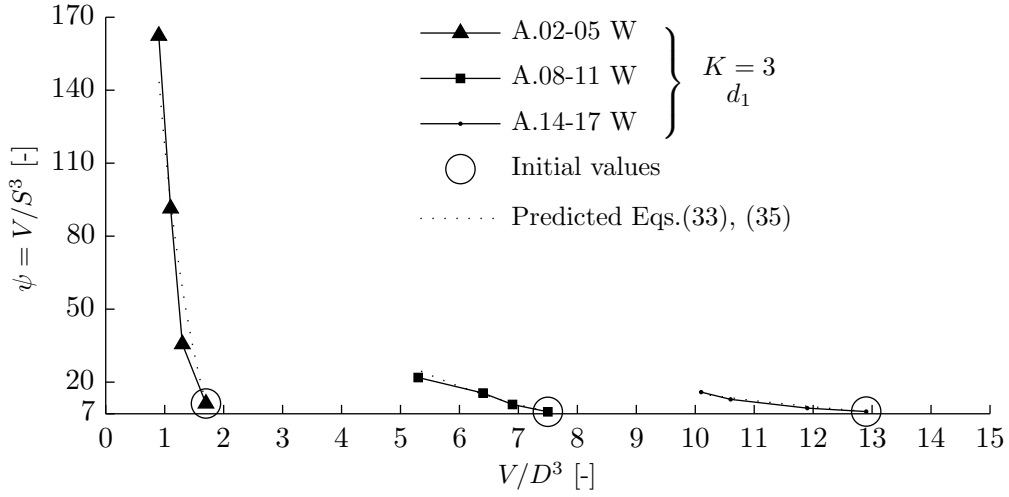

Figure 18.

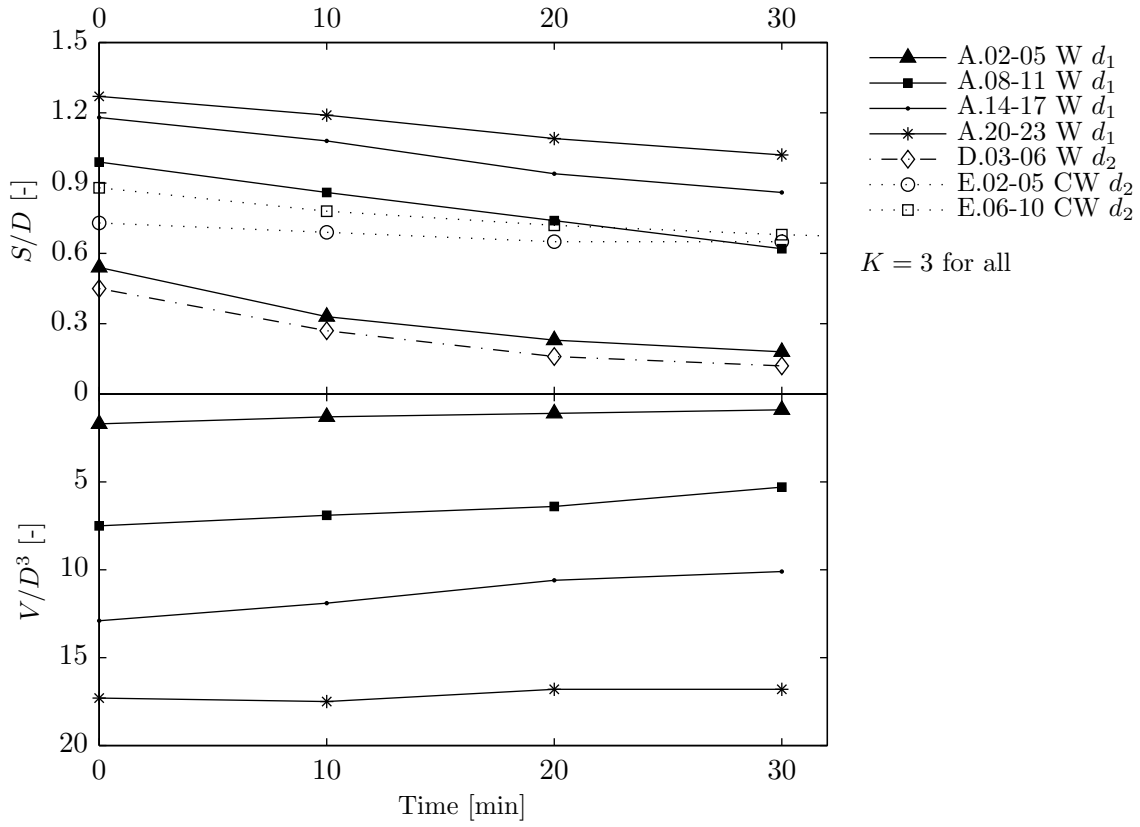
0
10
20
30
1.5
1.2
0.9
0.6
0.3
0
5
10
15
20
S/D [-]
V/D^3 [-]
Time [min]
A.02-05 W d_1
A.08-11 W d_1
A.14-17 W d_1
A.20-23 W d_1
D.03-06 W d_2
E.02-05 CW d_2
E.06-10 CW d_2
$K = 3$ for all

Figure 19.

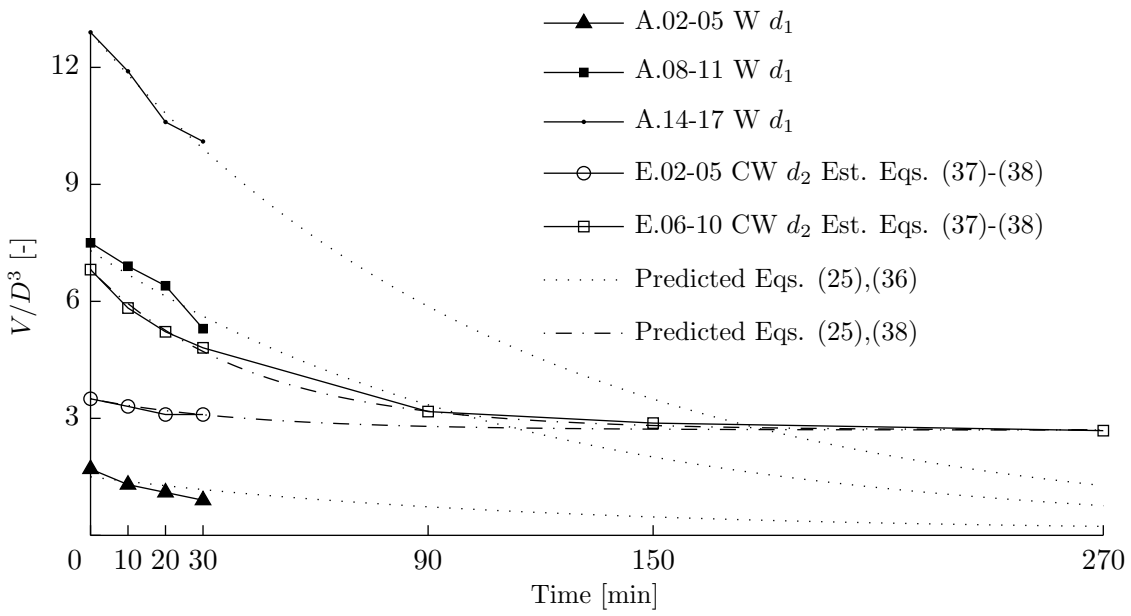
A.02-05 W d_1
A.08-11 W d_1
A.14-17 W d_1
E.02-05 CW d_2 Est. Eqs. (37)-(38)
E.06-10 CW d_2 Est. Eqs. (37)-(38)
Predicted Eqs. (25),(36)
Predicted Eqs. (25),(38)
V/D^3 [-]
12
9
6
3
0
10 20 30
90
150
270
Time [min]

Figure 20.

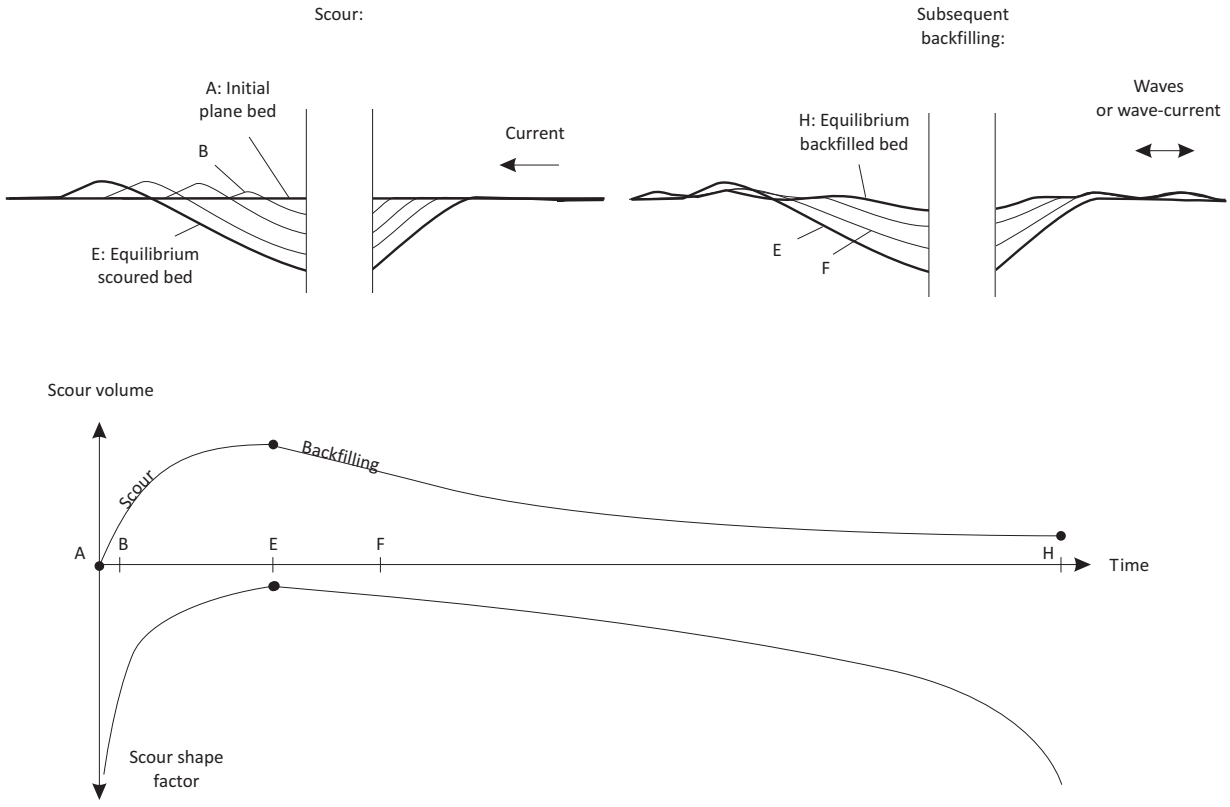
Scour:
Subsequent
backfilling:
A: Initial
plane bed
B
Current
H: Equilibrium
backfilled bed
Waves
or wave-current
E: Equilibrium
scoured bed
E
F
Scour volume
Scour
Backfilling
A
B
E
F
H
Time
Scour shape
factor

Figure 21.

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